COMMEMORATIVE NOTICE

OF

LOUIS AGASSIZ.

From the Annual Report of the Council of the American Academy
of Arts and Sciences for 1873.

By THEODORE LYMAN.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

PRESENTED by the AUTHOR.

Digitized by the Internet Archive
in 2015

https://archive.org/details/b22298575

LOUIS AGASSIZ.

In the village of Motier, where his father was pastor, Agassiz was born, May 28, 1807. He was christened Jean Louis Rodolph. Motier is in the Swiss canton of Freyburg, on the north-west border of Lake Morat, and not far from the famed battle-field. It has been supposed that the Agassiz were Burgundian Huguenots driven from France by the persecutions under Louis XIV. As a fact, however, the family has been Swiss for three centuries or more. The ancestors of Louis had, for six generations, been of the same calling as his father; and those who like to trace the workings of atavism will, perhaps, regard his strong theistic turn of mind as an hereditary character. Not so his passion for the study of nature, which grew with such intensity as to take complete possession of him by the time he had reached manhood. It was a growth not to be explained, and is an example of the multitude of exceptions to the so-called law of hereditary transmission. Already, while a boy, he began to collect insects at the gymnasium of Bienne; and, later, pursued a systematic study of the native plants of Orbe, a town on the great road over the Jura, whither his father had moved. At the academy of Lausanne he laid the foundations of a classical education, and in his eighteenth year began the study of medicine; for he was obliged to look forward to a time when his knowledge would be his only means of livelihood. After two years at Zurich, he went to Heidelberg in 1826, and there studied anatomy under the noted Tiedemann, and botany and zoölogy with Bischoff and Leuckhart. In the following year he entered the University of Munich, which then numbered very distinguished men among its professors. Oken, in some respects the most remarkable zoölogist that Germany has produced, there expounded his curious classification of the animal kingdom. Döllinger took the young Swiss into his house, and planted and fostered that interest in embryology which was to be a guide in his after career. His fellow-students remember vividly the remarkable appearance of Agassiz at that period, his active and powerful physique, the intellectual beauty of his face, his brilliant eye and gay laugh. Although a laborious and devoted scholar, he found time for athletic sports; and, as leading swordsman of the university, was elected president of the Swiss club, the *Helvetia.* At this the beginning of his scientific life, the bent of his mind towards a combination of natural history with metaphysics was already marked. While fitting himself for the practice of medicine, he attended Schelling's course of mental philosophy during four consecutive years; and this protracted study, in connection with the interest he took in the abstract theories of Oken, conclusively proves that the essential character of his intellect was the same in youth as in age. An irresistible passion, an intense longing to tear from Nature the secret of life, had now complete possession of Agassiz, and was destined not to lead, but to drive him during the remainder of his existence. The surroundings were, it is true, favorable, but it was because he sought them; and, had they not been favorable, he would have sought elsewhere. He has since said: "Our professors were themselves original investigators, daily contributing to the sum of human knowledge. They were not only our teachers, but our friends. The best spirit prevailed among professors and students. We were often companions of their walks, often present at their discussions; and when we met for conversation or to give lectures among ourselves, as we constantly did, our professors were often among our listeners, cheering and stimulating us in all our efforts after independent search. My room was our meeting place, bed-room, study, museum, library, lecture-room, fencing-room, all in one. Students and professors used to call it the Little Academy." It was the opening genius of the young student of medicine that made his poor chamber a little academy. This also it was that impelled Martius to intrust to him, a youth of twenty-one, the description of the fishes collected in Brazil by Spix. They were published in a grand folio in 1829, with a sounding Latin title: *Selecta genera et species piscium quos collegit et pingendos curavit Dr. J. B. de Spix: digessit, descripsit, et observationibus illustravit Dr. L. Agassiz.* It will be seen that already he was a doctor of philosophy, having taken the degree in 1829; and he passed examinations for medicine and surgery, the following year. Such was the reputation acquired through his book, that he found facilities offered him on all sides. Cotta, the publisher, furnished funds with which to support an artist. Fitzinger gave him free access to the great collections of Vienna, whither he had repaired to study the Danube fishes; for ichthyology had, by the accident of Martius's patronage, become his leading study. Nor was it long before he pushed his inquiries from the living to the fossil, and there opened before him that vast field in which he was to gather so rich a harvest. In 1831 he lived in Paris, and there acquired the warm friendship of Cuvier. There, too, for the second time, he saw Humboldt, who became, and ever remained, his wise counsellor and generous friend.

With this episode ends the student life of Agassiz. He was about to begin a profession which was one day to become an engrossing one, and was never to be relinquished by him, — the profession of a teacher. In 1832 he applied to M. Louis Coulon to obtain for him a position as Professor of Natural History in the Gymnasium of Neuchatel. No such chair then existed; but M. Coulon raised enough money to guarantee for three years a salary of 2000 francs, and the new professor was duly installed, already considering the best way of laying out so considerable an annual sum as $400. He found no museum there, and for lack of a lecture-room was obliged to give his course in a hall of the town-house. But this ill-provided teacher soon brought his branch to overshadow all others in the gymnasium. He sent for the specimens he had amassed in Germany, and with ceaseless activity added fresh ones, until a tolerable collection was ready for display and study. Then, with the confidence of a man having abundant resources in money and power, he proceeded to surround himself with the appliances of a great scientific centre, and to enter on a series of original investigations which might well have taxed the powers of half a dozen able men. He had constantly employed two artists, Weber and Dinkel, and a painter, Jacques Burkhardt, who had been his fellow-student at Munich, and who remained his life-long companion. Stahl, since noted as the best modeller at the Garden of Plants, was then employed at Neuchatel. Hercule Nicolet, summoned from Paris, was persuaded to set up, in this new home of science, a large lithographic establishment, where were published the last plates of the *Poissons fossiles;* those of the *Poissons d'Eau douce;* of the embryology of Coregonus; of the works on the Glaciers; and of the Echinoderms. That "Little Academy" of Munich now took on a new shape, and reappeared as La Société des Sciences Naturelles de Neuchatel. Its first meeting was in December, 1832, when Louis Coulon was chosen president, and Louis Agassiz secretary of the section of Natural History. It is needless to add that the section of Natural History was the important one in the society, and its secretary the important man of the section. The next fourteen years, during which he held the chair in Neuchatel, were especially his years of research and publication; and it is hardly conceivable that one man, even with able assistants, could within that period have done such an enormous amount of work. Thus far his attention had been directed chiefly to the class of fishes in which Martius had interested him. Their study had led him into paleontology, because of the great quantity of fossil species which had hitherto been the despair of ichthyologists. Fishes whose skeletons were soft, and which had thick muscles, were so crushed and distorted as to be unrecognizable, and the viscera were almost never to be distinguished. In the course of an exhaustive study of their anatomy, Agassiz discovered that the scales of fishes correspond by four kinds of structure to four grand natural divisions, which he called Ganoids, Placoids, Cycloids, and Ctenoids. With this basis, and aided by an intimate knowledge of the skeleton, he was enabled to tabulate all the known fossil species, to the number of a thousand; and these he published as *Recherches sur les Poissons fossiles*, in five volumes, with about four hundred plates of unusual excellence. This work, which was ten years in going through the press, was in itself enough to properly occupy a lifetime, and to give a reputation of the first class. In later years the author came to know that a classification founded on the scales alone was not without many exceptions, but it may well be doubted if any other classification has been discovered which comes so near to the natural affinities. The preparation of these volumes was laborious in the extreme. Agassiz was obliged to travel with an artist, in order to examine and figure the specimens which could not be sent to Neuchatel. The expense, too, was far beyond his slender means, so that, despite the aid obtained through Humboldt and other warm friends, he incurred heavy debts, which hampered him for many years. He was, however, a man who counted neither money nor time nor labor when knowledge was in the balance, and he hesitated not to enter on new and intricate investigations in the midst of his original work. Such was the mental capacity of this naturalist, not yet thirty years old, and such his endurance of continuous labor, that these numerous threads of research, instead of producing a hopeless tangle in his mind, seemed each to serve as a separate clew to the truth of nature. Already he had turned a curious eye towards the vast ice masses which furrow the sides of his native mountains, and in 1834 made a report on the observations of Hugi concerning the structure of glaciers. His summer vacations spent among the high ranges gave him good chances to push an investigation whose importance grew each year greater in his eyes. It was in 1837 that he threw what can only be called a bombshell into the geological camp. In July of that year the members of the Helvetic Society of Natural Sciences had assembled at Neuchatel; and it fell to Agassiz, in his capacity of president, to deliver the opening discourse. It was the noted *Discours sur l'ancienne Extension des Glaciers*, in which he carried to its rigid conclusion the fact, already observed by Venetz and Charpentier, that boulders are transported and rocks scratched and polished by glacial ice; and inasmuch as Switzerland is strown with these boulders, and exhibits in many places the scratching and polishing of rock surfaces, he did not hesitate to cover the whole country with a sheet of ice of vast thickness, and to extend the same condition of things over the north of Europe. This awful heresy fell with startling effect on the ears of the assembly. Leopold von Buch, the greatest geologist of his time, lost all control of himself and denounced the new theory with unmeasured severity. When shown the scratched surfaces near Neuchatel, he replied that the slides of the school-boys had made them; and he retired at last, exclaiming, "O Sancte de Saussure, ora pro nobis." Nothing could better have promoted the progress of truth than such violent opposition. Agassiz was spurred to fresh exertions, and began, next year, a series of detailed explorations, which were continued for eight successive seasons, and were especially thorough in the neighborhood of Mont Blanc and in the Bernese Oberland. Determined to ascertain the intimate structure and the movements of ice formations, he established himself, in the summer of 1840, on the median moraine of the Aar glacier, and lodged his party, which consisted of Desor, Vogt, Burkhardt, and Celestin Nicolet, under a large block of gneiss. This comfortless abode, which was invaded by frost at night and by trickling water in the daytime, was facetiously called *l'Hôtel des Neuchatelois*. Burkhardt used to relate how it was the privilege of him who first waked in the morning to direct with his finger the little streams of snow-water that meandered down the stone roof in such a way as to drip on the upturned faces of his sleeping companions. Such trivial anecdotes give us a vivid idea of the cheerful spirit in which these young men met the hardships and toil which were inseparable from their investigations. In 1842 a hut, of more comfortable character, was built on the bank which overhangs the left side of the glacier, and this served as a shelter during the rest of their visits. In 1840 and 1841 he published, in French and German, *Études sur les Glaciers*, accompanied by fine plates. His *Système Glaciaire*, with its maps and illustrations, did not appear till 1847. These great works, with numerous minor papers that accompanied them, have given Agassiz the deserved position of founder of the Glacial Theory.

While thus engrossed in geological and paleontological studies of the first importance, he still found time for other investigations. After a series of careful experiments in moulding, he produced in 1839 his paper *Sur les Moules de Mollusques vivans et fossiles.* Therein he showed that the soft parts of mollusca impress their form on the interior of the shell, which form can be reproduced by a cast, whose inequalities will represent those of the original animal. Therefore the *casts* of mollusks, so numerous in certain formations, were no longer to be considered as worthless. Passing from known to unknown, he first made interior casts of living shells, and studied them side by side with the animals; and the knowledge of the organs thus obtained was applied, *mutatis mutandis*, to fossil casts. This essay was followed (1842–45) by his *Études critiques sur les Mollusques fossiles.* During the same period his attention was further drawn to two lines of research which were destined to interest him ever after. They were the Radiata and the study of Embryology. The latter was confined to the development in the egg of the Swiss white fish (*Coregonus palaea*). Experiments continued through several seasons on artificially fecundated eggs were conducted, under the direction of Agassiz, by Carl Vogt, and were published in 1842 as a part of the *Poissons d'Eau douce.* And it is worthy of note that the government of Neuchatel issued in that year directions to fishermen for the impregnation of fish eggs, — an event which antedates the rediscovery of pisciculture by Rémy.

Agassiz did not, at that time, pursue further these observations; but it is plain that he pondered them much, and that they recalled the teachings of his good master, Döllinger, on the relations of embryology to zoölogy. His reflection was to take form some years later, and to throw new light on the intricate question of animal succession.

Echinoderms attracted the attention of Agassiz almost as early as fishes. His paper *Über die Echinodermen* appeared in the "Isis" in 1834, and in 1839 he published an admirable anatomical essay on Astrophyton. Doubtless the peculiar plan of structure of this class, so simple in theory and so varied in practice, struck him as one which might be intelligible, and might give solid points from which to approach the more complex plans. To these considerations was added the advantage of a wide distribution both of the living and the fossil representatives. However it may be, he pushed the investigations of Echinodermata with extraordinary energy and thoroughness, and was aided in the task by Desor. From 1838 to 1842 there appeared his *Monographies d'Echinodermes vivans et fossiles*, including a remarkable anatomy of the common sea-urchin, by Valentin. The preparation of this standard work was connected with some of Agassiz's happiest days, when he used to visit Paris for the sake of the great collections at the Garden of Plants, and for intercourse with the eminent men of science who were gathered there. And now, at the age of thirty-five, he had already put forth books on fishes, mollusks, and echinoderms, and on the geology of the drift period, any one of which would have given a reputation. During his fifteen years of arduous study, he had, with a care for detail scarcely to be expected in so ardent a character, prepared long lists of the generic names which occurred in his reading; and he conceived the idea of extending these lists so as to include the known genera of the entire animal kingdom. The work was revised and enlarged by twenty-two colleagues, each of whom took a group; and the whole was completed in 1846, under the name of *Nomenclator Zoölogicus.* It was as if the author had come to a period in his labors, and had made an index; for there was presently to be a change in his life and in his home.

At the suggestion of Lyell, Mr. John A. Lowell had, in 1845, invited Professor Agassiz to come to Boston and deliver lectures before the Lowell Institute. About the same time the King of Prussia, through the ever-thoughtful mediation of Humboldt, had presented him with a sum of money in aid of a scientific mission to America. Thus encouraged by invitation and by pecuniary aid, he crossed the Atlantic in the autumn of 1846, and made his *début* in the United States as a lecturer. A new country brought a new life and a different direction of energy. Hitherto Agassiz had been the brilliant discoverer, now he was to be the explorer and the teacher. It is true that the monographs he published during his American residence were numerous, and worthy of his former fame; yet they were not his distinguishing glory, as similar works had been in Neuchatel. So far as natural science was concerned, he found a people untaught and a country unexplored. He lectured, and was delighted at the interest he created, and the spirit of research that was roused. He fell to collecting, and gathered specimens with all the glee of a boy who has a holiday in a fruit garden; for Agassiz had to the full the boyish spirits that often characterize men of enthusiasm. In 1847 Mr. Abbott Lawrence, with the same judicious selection that M. Coulon had shown fifteen years before, offered to found for Agassiz a professorship of zoölogy and geology in the Scientific School at Harvard College. It was then that he obtained an honorable discharge from his European engagements, and fixed his abode in this country, where he could enjoy a social power and a freedom such as are seldom accorded to scientific men in the Old World. In 1848 he explored Lake Superior, and an account of the observations there made was edited by Mr. J. Elliot Cabot. At the request of Professor Bache of the Coast Survey, he passed the winter of 1850 among the Florida reefs, where he determined the law of growth by which that peninsula has gradually extended southward by the successive formation of reefs, keys, and mud flats. His stay at Charleston, S.C., led to his appointment, in 1852, to the chair of Comparative Anatomy at the Medical College, which he held for two terms, when a dangerous fever, brought on by exposure in collecting, compelled him to give up the position. He published in 1853 a paper on the newly discovered viviparous fishes of California, and he began also to turn his thoughts towards the elaboratiou of the vast material he had collected in America. Perhaps he remembered the little gymnasium in Switzerland and the great books that there grew up, and feared his colleagues might grow impatient at his long silence. The series of essays which he sketched was to be called "Contributions to the Natural History of the United States," which he hoped to carry to ten volumes. Nothing better showed the popularity of Agassiz than the subscription to this work, which reached 2,500 names. Of the series, only four volumes were published, while a fifth was left unfinished. They are: An Essay on Classification; North American Testudinata; the Embryology of Turtles; and the Acalephs, under which were included monographs of the Ctenophoræ, Discophoræ, and Hydroidæ, and an essay on the homologies of the Radiata. His chief assistant in their preparation was the late Professor H. J. Clark. They were illustrated by lithographic plates, which have never been surpassed in excellence, and the best of which were drawn by Sonrel.

The "Essay on Classification" is the flower of the mature thought of Agassiz. In it may be discovered the elaboration of ideas which are scattered through his earlier productions. To properly appreciate this masterly disquisition, it must be remembered that Agassiz had always a metaphysical mind, and one in which the idea of intelligent power was a ground principle. Although he had not accepted the results of Oken, he heartily admired his spirit, and ever spoke of him with pleasure.* Indeed, he may be said to have adopted the method of Cuvier and the inspiration of Oken. Advancing from this point, Agassiz interprets the phenomena of Not-self by those of Self. The last paper that came from his hand, "Evolution and Permanence of Type," has this sentence: "*It cannot be too soon understood that Science is one; and*

---

* Essay on Classification, p. 336.

that, whether we investigate language, philosophy, theology, history, or physics, we are dealing with the same problem, culminating in the knowledge of ourselves." The human mind is for him an entity in accord with the Creating Spirit, and capable therefore of studying and appreciating creation. This study and this appreciation he considers Science; and he finds in the animal kingdom the physical expression of various intellectual operations, some sharply defined and some shadowy, some simple and some hopelessly complex, just as are the familiar workings of the human mind. Not only is his erudition throughout remarkable, but his grasp of facts, intricate in their relations and numerous, is quite amazing. In nothing is this better exhibited than in his celebrated demonstration of the correspondence of embryological, geological, and zoölogical succession. He shows that, in many orders, the species which first appear in the older beds resemble the embryo of the highest species now living; and, moreover, that this fossil and this embryo have characters in common with the living species that stand lower in the zoölogical scale. Thus among Crustacea the living Brachyurans stand highest; but the embryo of the Brachyuran has a long tail like the Macrourans, which are characteristic of the middle geological periods, and among the living are zoölogically inferior to the Brachyurans.

Agassiz was, however, not destined to resume his old habits of investigation and publication. The will of Mr. Francis C. Gray established in 1858 a fund for the support of a Museum of Comparative Zoölogy; and a liberal private subscription, seconded by a large gift from the State, assured the future of the establishment. Henceforth the current of Agassiz's thought ran in a new channel. In the words of a recent notice of him: "He determined to found a great museum arranged to show his views of the relations of living animals among themselves, and their connections in the geological and embryological successions. Such a museum he hoped to leave as a legacy — his all — to the people of this country, and to make it at once a mark of his affection and a monument of his labor. He gave less and less of his time to those special investigations by which he had gained his reputation, and pondered more and more on this museum which should serve as a sort of tabulation of the creative thought by presenting the creations themselves in a connected order."

Day by day he labored to increase the collections, and to push their arrangement. His Brazilian expedition, undertaken in 1865, at the cost of Mr. Nathaniel Thayer, brought back vast riches; but not even the sight of familiar fishes, that took him back to Munich and the time of Spix and Martius, could turn him again to special studies. He kept on with ever-increasing toil, and yet preserved his relations to the public, his popular lectures, his interest in education and agriculture, his voluminous correspondence. All this, in addition to his duties as Professor of Natural History, was too much even for his powerful frame, and in 1869 he was seized with a cerebral attack which threatened his life. From it he recovered only to enter, with all the spirit of a youth just beginning the world, upon the Hassler expedition of 1871, which was under the direction of the Coast Survey. He endured without complaint the hardships of a voyage round Cape Horn in a small steamer, and returned laden with new collections.

The last year of his life was a very happy one. He saw the museum well supplied with funds, growing in size, and advancing towards arrangement. There came besides, from Mr. John Anderson, the gift of the Island of Penikese and of a large sum in money, to found a summer school of Natural History. It was at once started with about fifty pupils, and Agassiz had the great pleasure of founding the first establishment of the kind in the world.* But he killed himself in doing it. It was precisely this new and prolonged strain, at a season when usually he took a sort of vacation, that shattered his system beyond the power of repair; and on December 14, 1873, he died.

If we consider simply the influence of his philosophical opinions on the mass of scientific men, Agassiz lived too late and also too early. At all stages of its progress, the human mind presents a kind of atrophy of some of its parts; and he who treats of such topics as are appreciated only by these parts speaks to deaf ears. Continuance in one set of opinions through several generations produces at last lassitude, then a sort of rebellion, and finally the welcoming of any thing novel, as a glad relief. Here is a great, if not the greatest, cause of changes, which are, on the whole, beneficial. The tree of knowledge at such times throws out new and strong branches, albeit they are all on one side. Thus it has been with natural science. Scholars got tired of Bridgewater treatises, and talk of means and ends, and of plans of creation; moreover, they were in some places exasperated by opposition from Church or State. Then they were getting suffocated by their material; and, when the species of shells increased to thousands, and of beetles to tens of thousands, they exclaimed, "It is enough, — give us relief!" Their relief was like that of the Mediæval Catholic Church.

---

* The station of Dr. Dohrn, at Naples, is of a different character, and was not then in working order.

Positivism advanced, and said: "Bury every thing that is inconvenient, and come and lean on me, and I will give you peace. Thought and causation have no real existence. They and you are only figures in a procession that has neither beginning nor end. Amuse yourselves, therefore, by looking at this procession, until the inevitable comes upon you." This is the philosophy which to-day is powerful among thinking men; and its tide is fated to rise higher before it ebbs. Like all systems, it will work good and evil; but its good will remain, and its evil melt away.

Against such a current Agassiz struggled in vain. He was a theistic philosopher, who chose for his field the working of Supreme Thought in the animal creation. He addressed a world of learned men, the majority of whom could not understand what basis theistic philosophy had, and of whom not a few accused him of want of honesty for even introducing such a theme. The time will come when his power and insight will be appreciated. Meanwhile we must be content with his successes that lay in a lower plane: they were his special zoölogical investigations, and his brilliant career in the United States, where he roused an enthusiasm for high studies, and where he established a great centre of science.